

## REMARKS

### *Status of Application*

In the Advisory Action dated September 15, 2005, the Examiner indicated that the Applicant's arguments in the Reply dated August 31, 2005 were not persuasive, and referred Applicant to the May 31, 2005 Office Action. While Applicant appreciates the Examiner's consideration of Applicant's Reply, Applicant respectfully submits that the Examiner's mere restatement of the Office Action's rejections, without providing any guidance as to why the arguments of Applicant's Reply do not overcome the cited references, do not enable Applicant to adequately respond to the outstanding rejections.

For example, in the August 31, 2005 Reply, Applicant noted that the rejection of claim 11 under 35 U.S.C. §102(b) was improper because the Examiner only applied the §102(b) reference to the additional feature claimed in claim 11, and not to all of the features of claim 11 and the claim on which it depends (claim 1). *See* 37 C.F.R. §1.75; M.P.E.P. §§608.01(i), 706.02 (IV). The Examiner's circular reference to the May 31, 2005 Office Action does not address this issue, and therefore Applicant is unable to further respond to this rejection other than to restate the arguments made in the previous Reply.

With respect to the obviousness-type double patenting rejection and associated §103(a) rejection, Applicant respectfully submits that claim 1, as amended, overcomes the cited references. While Applicant believes that the arguments made herein are sufficient to overcome all outstanding rejections, Applicant respectfully requests further guidance in a non-final Office Action if the Examiner does not find the arguments to be persuasive.

### *Objection to the Drawings*

Applicant respectfully submits that the amendment to FIGs. 2 and 3 in Applicant's August 31, 2005 Reply overcome the Office Action's objection to these figures, and therefore Applicant respectfully requests withdrawal of the outstanding objection.

### *Objections to the Specification*

Applicant respectfully submits that the August 31, 2005 Reply's amendment to Equations (8) and (17) overcomes the Office Action's objection to those claims. Likewise,

Applicant respectfully submits that the August 31, 2005 Reply overcomes the Office Action's objection to the incorporation by reference of allegedly "essential material" for the reasons discussed in that Reply. Accordingly, Applicant respectfully requests withdrawal of the objection to the specification.

***Claim Objections***

Applicant respectfully submits that the amendment made to claim 1 in Applicant's August 31, 2005 Reply overcomes the Office Action's objection to claim 1. Applicant therefore requests withdrawal of the objection to claim 1.

***Claim Rejection – 35 U.S.C. §112, First Paragraph***

Applicant respectfully submits that the arguments made in the Applicant's August 31, 2005 Reply overcome the Examiner's rejection of claims 1-9 and 11 under 35 U.S.C. §112, first paragraph. For the reasons discussed in that Reply, therefore, Applicant respectfully requests that the rejection of these claims be withdrawn.

***Claim Rejection – 35 U.S.C. §112, Second Paragraph***

In the Advisory Action dated September 15, 2005, the Examiner indicated that the Applicant's Reply dated August 31, 2005 has overcome the rejection of claim 6 under 35 U.S.C. §112, second paragraph.

***Double Patenting Rejection***

Claim 1 stands rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claim 2 of U.S. Pat. No. 6,527,695 B1 ("Davey 1"), in view of Ruohonen, "Transcranial Magnetic Stimulation: Modeling and New Techniques," Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pp. 1-50 ("Ruohonen").

Claim 1 has been amended. Support for the amendment of claim 1 may be found at least at, for example, pages 11-12 of the as-filed application.

Applicant respectfully submits that Ruohonen fails to cure the deficiencies of Davey 1 and, as a result, Claim 1 is not obvious in view of Davey 1 and/or Ruohonen, either taken alone or in combination.

For example, claim 1 recites:

1. A computerized method of optimizing properties of a magnetic core, the core having inner and outer radii and windings, the computerized method having computer-executable instructions for performing the following:

a) allowing the inner and outer core radii to change parametrically in a nested loop;

b) *computing core reluctance, number of turns, and winding resistance for each position, wherein the core reluctance is computed using a boundary element analysis for the core, wherein the core is assumed to have a one-turn inductance;*

c) computing a maximum induced membrane voltage based on the following equation:

$$V_m(t) = f \sqrt{\frac{2W}{\Re}} \omega \tau_L (4\omega^2 \tau_L^2 - 1) \cdot \frac{\left( e^{-\frac{t}{2\tau_L}} \cos(\beta) + \frac{e^{-\frac{t}{2\tau_L}} (2\tau_L \tau_m \omega^2 - 1) \sin(\beta)}{\sqrt{4\omega^2 \tau_L^2 - 1}} - e^{-\frac{t}{\tau_m}} \right)}{4\omega^4 \tau_m^2 \tau_L^3 + \omega^2 (4\tau_L^3 - \tau_m^2 \tau_L) + (\tau_m - \tau_L)};$$

$$\text{where } \beta \equiv \frac{1}{2} \sqrt{\frac{4\omega^2 \tau_L^2 - 1}{\tau_L^2}} t.$$

d) *fitting the maximum induced membrane voltage to the inner and outer core radii using a multi-variable spline analysis;* and

e) using a variable metric sequential quadratic program algorithm to compute a value for the inner and outer core radii that maximizes the maximum induced membrane voltage.

(Emphasis added). The Examiner points to p. 23 of Ruohonen as disclosing “modeling TMS and using the developed models as a basis for engineering modifications that would increase the utility of TMS.” May 31, 2005 Office Action at p. 8. Specifically, the Examiner refers to the following statements on p. 23 of Ruohonen: “[c]oil design must always be taken into account when constructing TMS equipment,” “[i]n one study, a mathematical method was used to maximize the focality by changing the coil shape,” and “[p]roblems with power consumption and coil heating can be alleviated by reducing the coil’s resistance, determined by the wire gauge and coil geometry.” See May 31, 2005 Office

Action at pp. 8-9. Applicant respectfully submits that Ruohonen fails to cure the deficiencies of Davey 1 because Ruohonen also fails to teach or suggest the claimed methods for optimizing a magnetic core.

As a preliminary matter, Applicant respectfully submits that Ruohonen fails to teach “[computing] core reluctance ... using a boundary element analysis for the core, wherein the core is assumed to have a one-turn inductance,” and therefore claim 1 is allowable for this reason alone. In addition, Ruohonen merely provides some suggested core features or characteristics that might need to be taken into account. Ruohonen fails to teach or suggest: “allowing the inner and outer core radii to change parametrically in a nested loop” or “computing core reluctance, number of turns, and winding resistance for each position, *wherein the core reluctance is computed using a boundary element analysis for the core, wherein the core is assumed to have a one-turn inductance*” as claimed.

Ruohonen’s statement that “[c]oil design must always be taken into account when constructing TMS equipment” merely teaches what should be apparent: one cannot construct TMS equipment haphazardly, without regard for coil design. But making a general statement about coil design and providing a few generic examples does not teach a skilled artisan all conceivable methods for carrying out such a design. In other words, the mere suggestion to make *some* modification to the coil would hardly provide a skilled artisan with sufficient motivation to make *the claimed modifications* to a coil. *See* M.P.E.P. §§706.02(j), 2144. Thus, even if the teachings of Davey 1 and Ruohonen were combined, they would not teach or suggest the claimed invention to a skilled artisan. Accordingly, Applicant respectfully requests that the rejection of claim 1 under the judicially created doctrine of obviousness-type double patenting be withdrawn.

***Claim Rejection – 35 U.S.C. §102(b)***

Claim 11 stands rejected under 35 U.S.C. §102(b) as allegedly being anticipated by U.S. Pat. No. 5,725,471 (“Davey 2”). Applicant respectfully traverses the rejection of claim 11 and, in any event, again submits that the rejection of dependent claim 11 under 35 U.S.C. §102(b) is improper. Specifically, claim 11 depends on claim 1, which the Examiner has rejected under 35 U.S.C. §103(a). As recited in 37 C.F.R. §1.75: “[c]laims in dependent form shall be construed to include all the limitations of the claim incorporated by reference into the

dependent claim.” *See also* M.P.E.P. §608.01(i). Thus, to properly reject a dependent claim under 35 U.S.C. §102(b), the Examiner must find a reference that teaches all of the limitations of the dependent claim *and of any claims from which the dependent claim depends*. *See* M.P.E.P. §706.02 (IV).

The May 31, 2005 Office Action has not pointed to any teaching in Davey 2 that corresponds to the features of claim 1 and has not disclosed any reason for combining the teachings of Davey 2 with those of the references used to reject claim 1. Accordingly, Applicant respectfully requests that the rejection of claim 11 under 35 U.S.C. §102(b) be withdrawn.

***Claim Rejection – 35 U.S.C. §103(a)***

Claims 1-9 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Davey 1 in view of Ruohonen, “Transcranial Magnetic Stimulation: Modeling and New Techniques,” Doctoral Thesis, Department of Engineering Physics and Mathematics, Helsinki University of Technology, 1998, pp. 1-50 (“Ruohonen”). Claim 1 has been amended. Applicant respectfully submits that Davey 1 and/or Ruohonen, either taken alone or in combination, fail to teach or suggest the subject matter of claims 1-9 for the reasons discussed above in connection with the present Reply’s discussion of the obviousness-type double patenting rejection. Accordingly, Applicant respectfully requests that the rejection of claims 1-9 under 35 U.S.C. §103(a) be withdrawn.

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**PATENT**  
**REPLY FILED UNDER EXPEDITED**  
**PROCEDURE PURSUANT TO**  
**37 CFR § 1.116**

### **CONCLUSION**

In view of the foregoing, applicants respectfully submit that the claims are allowable and that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested. In the event that the Examiner cannot allow the present application for any reason, the Examiner is encouraged to contact the undersigned attorney, Christos A. Ioannidi at (215) 564-8994, to discuss resolution of any remaining issues.

Respectfully submitted,

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